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PATENT APPLICATION

ATTORNEY DOCKET NO. 200210053-1

Inventor(s): Tom Etheridge

Confirmation No.: 5065

Application No.: 10/618,522

Examiner: Brian K. Talbot

Filing Date: 07/11/2003

Group Art Unit: 1762

Title: **METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC AMINE COMPLEXES**

Mail Stop  
Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450

**TRANSMITTAL LETTER FOR RESPONSE/AMENDMENT**

Transmitted herewith is/are the following in the above-identified application:

- ☐ Response/Amendment  
☐ New fee as calculated below  
☒ No additional fee  
☒ Other Response to Notification of Non-Compliant Appeal Brief
- ☐ Petition to extend time to respond  
☐ Supplemental Declaration
- Fee\$

CLAIMS AS AMENDED BY OTHER THAN A SMALL ENTITY						
(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT	(3) NUMBER EXTRA	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEES
TOTAL CLAIMS		MINUS		= 0	X \$50	\$ 0
INDEP. CLAIMS		MINUS		= 0	X \$200	\$ 0
<input type="checkbox"/> FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM					+ \$360	\$ 0
EXTENSION FEE	<input type="checkbox"/> 1st Month \$120	<input type="checkbox"/> 2nd Month \$450	<input type="checkbox"/> 3rd Month \$1020	<input type="checkbox"/> 4th Month \$1590		\$ 0
OTHER FEES						\$
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT						\$ 0

Charge \$ 0 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450.

Date of Deposit: 07/11/2007

Typed Name: Brenda Wiseman

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Respectfully submitted,

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By

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APPEAL BRIEF  
DOCKET NO. 200210053-1

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPELLANT:	Tom Etheridge	<div style="border: 1px solid black; padding: 5px;"><p style="text-align: center;"><b><u>CERTIFICATE OF MAILING</u></b> <b><u>UNDER 37 C.F.R. § 1.8</u></b></p><p>DATE OF DEPOSIT: July 11, 2007</p><p>I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being deposited with the United States Postal Service under 37 C.F.R. § 1.8 on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313.</p><p style="text-align: center;"><i>Brenda Wiseman</i> <b>Brenda Wiseman</b></p></div>
SERIAL NO:	10/618,522	
FILED:	July 11, 2003	
FOR:	METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC AMINE COMPLEXES	
ART UNIT:	1762	
EXAMINER:	Talbot, Brian K.	
DOCKET NO.:	200210053-1	

**APPELLANTS' APPEAL BRIEF UNDER 37 C.F.R. § 41.37**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Mail Stop Appeal Brief – Patents

Dear Sir:

Appellants submit this appeal brief in connection with their appeal from the final rejection of the Patent Office, mailed September 25, 2006, in the above-identified application, and in response to the Notification of Non-Compliant Appeal Brief dated June 14, 2007. A Notice of Appeal was filed on December 20, 2006.

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

## II. RELATED APPEALS AND INTERFERENCES

Appellants and Appellants' legal representatives know of no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### III. STATUS OF CLAIMS

Claims 9-25 and 35 remain pending. Claims 26-27 have been withdrawn from consideration and claims 1-8 and 28-34 have been canceled. Thus, the claims on appeal in this application are claims 9-25 and 35, which constitute all of the claims presently pending for consideration.

#### IV. STATUS OF AMENDMENTS

No amendments to pending claims 9-25 and 35 have been made since the office action mailed on September 25, 2006, which was the final rejection of the pending claims.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

9. (previously presented) A method of forming an electrically conductive pathway, comprising steps of:

- a) jetting a first ink-jetable composition onto a substrate, said first composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;
- b) overprinting or underprinting a second composition with respect to at least a portion of the first ink-jetable composition to form a predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and
- c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate.

In summary, the invention claimed in independent claim 9 provides for a method of forming an electrically conductive pathway. The method includes jetting a first ink-jetable composition onto a substrate. Page 2, line 18; page 6, lines 2-16; and page 8, lines 26-31. The first composition includes a first liquid vehicle and a palladium aliphatic amine complex solvated therein. Page 2, lines 19-20; page 3, line 21 – page 4, line 7; page 4, lines 12-15; and page 5, line 1 – page 8, line 23. The method also includes overprinting or underprinting a second composition with respect to at least a portion of the first composition so as to form a predetermined pattern. Page 2, lines 20-22; page 9, lines 2-12 and lines 28-31; and page 18, line 29 – page 19, line 2. The second composition includes a second liquid vehicle and a reducing



agent solvated therein. Page 2, lines 20-22; page 3, lines 21-29; page 4, lines 12-15; and page 8, line 25 – page 10, line 30. Heat is then applied to the predetermined pattern in an amount sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate. Page 2, lines 22-25; page 9, lines 7-9; and page 10, lines 10-25.

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The issue presented for review is: whether claims 9-25 and 35 are unpatentable under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 3,896,252 (hereinafter “Tuttle”) or U.S. Patent No. 4,285,991 (hereinafter “Gedrat”) in combination with U.S. Patent No. 4,668,533 (hereinafter “Miller”).

## VII. ARGUMENT

### A. Prosecution History

The present application was filed on July 11, 2003, as U.S. Patent Application Serial No. 10/618,522, and is entitled METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC AMINE COMPLEXES. The present application was filed as an original utility application.

In the first Office Action mailed May 10, 2005, claims 1-34 were subject to a restriction and/or election requirement. Group I included claims 1-8, drawn generally to a composition. Group II, including claims 9-25, was drawn generally to a method for forming an electrically conductive pathway. Group III, including claims 26-27, was drawn generally to a substrate. And, Group IV, including claims 28-34, was drawn generally to a system. In the Office Action, the Examiner requested affirmation of the provisional election of Group II, claims 9-25, as was communicated by Gary Oakeson, the undersigned, during a telephone conversation with the Examiner on May 4, 2005. In the same Office Action, the Examiner requested a more descriptive title. Further, the Examiner rejected claims 14, 15, and 19 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner also rejected claims 9-25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,222,218 (hereinafter "Beltzer") in combination with U.S. Patent No. 4,668,533 (hereinafter "Miller"); claims 9-25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,896,252 (hereinafter "Tuttle") in combination with Miller; and claims 9-25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,846,138 (hereinafter "Gulla") in combination with Miller. In a reply submitted by the Appellant on August 5, 2005, the election of Group II, being claims 9-25, was affirmed.

The title was amended from PALLADIUM COMPLEXES FOR PRINTING CIRCUITS to METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC AMINE COMPLEXES. In the same response, the Appellant respectfully disagreed with the reasons for rejection based on 35 U.S.C. § 112 and 103.

In a final Office Action dated September 30, 2005, the objection to the specification was withdrawn. Additionally, the rejections based on Gulla and Beltzer were withdrawn. The Examiner persisted in the rejections based on 35 U.S.C. § 112 regarding claims 14 and 15, and the rejections based on 35 U.S.C. § 103(a) over Tuttle in combination with Miller.

Appellant submitted a response to the final Office Action along with a Request for Continued Examination (RCE), on December 20, 2005. In the response, the Appellant amended claim 9 part a) to remove “in a predetermined pattern” regarding jetting a first ink-jettable composition onto a substrate. Part b) of claim 9 was also amended to include the language “overprinting or underprinting a second composition with respect to at least a portion of the first ink-jettable composition to form a predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and . . .” The Appellant noted that the amendments to claim 9 were made in an effort to move prosecution along and were further intended to clarify the language related to the rejection of claims 14 and 15 under 35 U.S.C. § 112. Regarding the rejection under 35 U.S.C. § 103(a) of claims 9-25 over Tuttle in combination with Miller, Appellant argued that the references fail to make a *prima facie* case of obviousness in that i) it has failed to show motivation to modify or combine the references cited, and ii) that the cited references failed to teach or suggest all of the claim limitations of the prosecuted invention.

In response to the RCE, the Examiner issued a non-final Office Action on March 2, 2006. In the Office Action, the Examiner requested cancellation of nonelected claims or other appropriate action and noted that such request had been issued in previous correspondence. The Examiner also withdrew the rejection based on 35 U.S.C. § 112 over claims 14 and 15. Claims 9-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tuttle or U.S. Patent No. 4,285,991 (hereinafter “Gedrat”) in combination with Miller.

The Appellant submitted an amendment and response on June 6, 2006. By the amendment, claims 1-8 and 28-34 were canceled and new claim 35 was added, which included “The method of claim 9, wherein the first liquid vehicle further comprises non-complexed amine.” The Appellant respectfully presented argument to the point that a *prima facie* case of obviousness had not been presented. Specifically, the combination of references failed for not teaching each and every element of the claims, and failed to provide sufficient teachings or motivation to combine in order to arrive at Appellant’s invention. The Appellant further submitted that the combination of references was based on hindsight.

In response to the amendment and response submitted by the Appellant, the Examiner issued a Final Office Action rejection on September 25, 2006. The Final Office Action rejected claims 9-25 and 35 under 35 U.S.C. § 103(a) as being unpatentable over Tuttle or Gedrat in combination with Miller. After receiving the Final Office Action rejection, Appellant decided it would be beneficial to appeal the present claims so that a neutral third party could decide these issues. Appellant filed a Notice of Appeal on December 20, 2006.

The shortcomings of the rejections will now be reviewed. Arguments and statements by Appellant made earlier but not repeated here are also part of the record for this appeal and are not

waived; although they may be modified or supplemented herein. To keep this brief short while still trying to provide an adequate basis for review, some observations and arguments that might have been presented are not included. Accordingly, Appellants' silence herein with respect to particular statements by the United States Patent and Trademark Office does not indicate their agreement with or acquiescence thereto.

B. Appellants' Invention

As evidenced by the art of record, various methods of printing circuit patterns are known. What Appellants have invented, and set forth in the claims, is a method of forming an electrically conductive pathway that utilizes specific compositions in specific application that combine to achieve a desired result. The method provides the steps of a) jetting a first ink-jettable composition onto a substrate, where the first composition includes a first liquid vehicle and a palladium aliphatic amine complex solvated therein; b) overprinting or underprinting a second composition with respect to at least a portion of the first ink-jettable composition to form a predetermined pattern, where the second composition includes a second liquid vehicle and reducing agent solvated therein; and c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate. In other words, the specific method as claimed requires the use of an ink-jettable composition that includes palladium aliphatic amine complex, and a second composition with a reducing agent capable of reacting with the palladium aliphatic amine complex to form palladium metal under heat, and in such a way as to not substantially alter the substrate. Further, both compositions must be printed on the substrate in a predetermined pattern so as to achieve the desired end result.

To Appellants' knowledge, they were the first to form an electrically conductive pathway by following the method outlined in the claims. Specifically, the method includes jetting one composition (including palladium aliphatic amine complex) and overprinting or underprinting a reducing agent to form a predetermined pattern. The predetermined pattern is then heated to cause a reaction that produces palladium metal. This process yields an electrically conductive pathway of palladium metal on a substrate.

C. The Asserted References

1. The Tuttle Reference

Tuttle discloses a process of metal plating on plastics. See title, col. 1. The process includes polymerizing monomers in the presence of a rubber in a finely divided form. See Abstract. The process further includes aminating the surface to be metallized with a solution of ethylenediamine or 1,3-diaminopropane in an inert solvent, then treating with a noble metal salt solution, and thereafter with a reducing agent to produce a metallized surface. See Abstract. The Tuttle disclosure teaches achieving uniform coatings of metal over an entire surface of plastic materials. See col. 3, ln. 8-65, Examples 1-7. The reference and examples all teach immersion plating baths to achieve the stated metal coatings. See col. 4, lines 11-17. The Tuttle patent provides an apparently improved manner in which such electroplating can be performed on plastic materials. However, the plastic materials require special preparation. Specifically, Tuttle states, "essential to the invention is the use of a rubber modified thermoplastic polymer . . . [otherwise] the benefits of this invention are not obtained." See col. 2, ln. 14-19.

2.     The Gedrat Reference

Gedrat teaches a method for producing printed circuits. See Title and Abstract. Gedrat discloses using palladium complexes to activate an entire copper coated plate as a complete coating. See col. 4, ln. 47 – col. 5, ln. 39. The reference also discloses the use of screen or photo printing. See Abstract. However, as can be seen from the specification and especially Examples 3 and 4, the use of screen printing is reserved for either negatively or positively masking the desired circuit pattern prior to etching in order to form the circuit. See col. 4, ln. 47 – col. 5, ln. 39.

3.     The Miller Reference

Miller teaches ink-jet printing of printed circuit boards. See Title, Abstract. Particularly, the reference teaches using ink-jet technology for the imagewise deposition of ink onto a substrate in an effort to produce a metal imaged circuit board. See Abstract. The method includes depositing an ink with a first metal or metal containing activator on a substrate in a predetermined pattern by the ink-jet process. See col. 2, ln. 32-34. The method further includes depositing, by electroless deposition, a second metal in a pattern substantially congruent to that made by the first metal. See col. 2, ln. 35-39.

D.     Rejections Under 35 U.S.C. § 103(a) over Tuttle or Gedrat in combination with Miller.

The Examiner rejected claims 9-25 and 35 as being *prima facie* obvious over Tuttle or Gedrat in combination with Miller under 35 U.S.C. § 103(a). The PTO, through the Examiner, has the burden of establishing *prima facie* obviousness. Appellant contends that the Examiner



has not met its burden of establishing a *prima facie* case of obviousness for lack of sufficient teachings or motivation to combine or modify to arrive at the Appellant's invention, and for lack of teaching each and every element of the present invention. The Appellant further contends that the combination of references is based on hindsight. Therefore, the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

1.     Requirements for Prima Facie Obviousness

Before discussing the § 103 rejections, it is thought proper to restate what is required to sustain such a rejection. The issue under § 103 is whether the PTO has stated a case of *prima facie* obviousness. "The PTO has the burden under § 103 to establish a *prima facie* case of obviousness." In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). To satisfy this burden, the PTO must meet the criteria set out in MPEP § 706.02(j):

. . . three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

With this brief background in mind, Appellants contend that the Patent Office has failed to meet its burden of making a *prima facie* case of obviousness. The Office has failed to show that the cited references together teach each and every element of the present claims, nor do the asserted references provide sufficient teachings or motivation to be combined in order to arrive at Appellant's invention. Further, Appellants contend that the combination of references is based on hindsight. Therefore, without knowledge of the disclosure of the present invention, one of

ordinary skill in the art would not be able to make the combination of either Tuttle or Gedrat and Miller to arrive at the claimed invention.

2. Non-obviousness

a) Lack of Teachings or Motivation to Combine or Modify to the Appellant's Invention

The combination of Tuttle or Gedrat with Miller fails to provide sufficient teachings or motivation to combine in order to arrive at Appellant's invention. The Appellant contends that the combination of Tuttle or Gedrat and Miller requires a number of additional modifications, not taught in the combination, to arrive at the Appellant's invention. Specifically, at least five (5) separate modifications or steps are required to arrive at the invention claimed by the Appellant. Specifically, first, the combination of these references must first be made based on some motivation. Second, the particular classes of materials must be chosen from among the many identified alternatives. Third, the specific teaching of Tuttle or Gedrat must be modified to arrive at a single "palladium aliphatic amine complex." Fourth, this modified complex must be *further* modified such that it is made ink-jettable. Fifth, these modified compositions being applied to the substrate must then be heated. None of these steps are taught, suggested, or would be motivated by the teachings of either reference.

In a similar circumstance, the CCPA found that substantial reconstruction and modification of cited references was not an acceptable basis for an obviousness rejection. Specifically, the court stated "We, therefore, find that Chinnery et al. did not teach the shaft sealing art how to solve the problems which existed in that art at the time of appellant's invention. . . . This suggested combination of references would require a substantial

reconstruction and redesign of the elements shown in Chinnery et al. as well as a change in the basic principles under which the Chinnery et al. construction was designed to operate . . . when viewed as of the time appellant's invention was made, and without the benefit of appellant's disclosure, we find nothing in the art of record which suggests appellant's novel oil seal.” *In re Ratti*, 270 F.2d 810, 813, 123 U.S.P.Q. 349 (C.C.P.A. 1959).

Specifically, the Tuttle reference fails to supply a motivation to combine the teachings with any non-coating related references, much less an ink-jet reference such as Miller. Further, the Gedrat reference does not suggest applying palladium or a reducing solution by a non-coating related means. As discussed above, the entire disclosure of Tuttle refers to achieving uniform coatings of metal over an entire surface of plastic materials. It is well known in the industry that such metallization of plastics is used for decorative or film barrier applications and can include aesthetic effects such as decoration, shimmer, etc., barriers to permeation of gases or liquids through the material and the like. This is illustrated by the fact that the disclosure and examples all teach immersion plating baths to achieve the stated metal coatings. Those skilled in the art would fail to find any motivation to use the teachings of Tuttle in an ink-jet environment. Likewise, Gedrat teaches using palladium complexes to activate an entire copper coated plate as a complete coating. Examples 3 and 4, particularly, show that the palladium materials are exclusively used in preparing a coating over an entire surface.

The Examiner has responded previously by citing case law regarding sources of motivation. However, the Examiner provides no such specific motivation and rather provides mere speculation regarding what someone skilled in the art would consider obvious. In contrast, Appellant asserts that the cited references provide no such motivation and those skilled in the art

would not combine or modify the references to arrive at the claimed invention. Specifically, coatings of large surface areas versus printing of features such as electrical circuits are significantly different matters and endeavors. For example, ink-jetting to achieve a solid coating would be a highly inefficient process, so much so that the subject matter of the Tuttle and Gedrat patents would not lead someone to ink-jet printing of small features and patterns such as printed circuits. In fact, such desires for coating large areas would lead someone skilled in the art away from ink-jet or most other printing technologies.

Further, the Tuttle patent provides an apparently improved manner in which such electroplating can be performed on plastic materials. However, the plastic materials require special preparation; specifically, the essential use of a rubber modified thermoplastic polymer. The substrates of the present invention do not require any such special formulation. Substantial adhesion to the substrate is not necessarily required in the claimed invention. Therefore, those skilled in the art would not be motivated to consider such a process or its materials in ink-jet printing.

Regarding the Gedrat reference, the Examiner points to the teachings of printing using screen or photo printing. However, as can be seen from the specification and especially Examples 3 and 4, the use of screen printing is reserved for either negatively or positively masking the desired circuit pattern prior to etching in order to form the circuit. As such, the reference is very similar to Tuttle in that the palladium materials are exclusively used in preparing a coating over an entire surface (or at least an entire exposed surface), and not in the manner as presently claimed.

Assuming that the combination of Tuttle and Gedrat with Miller were appropriate, which

point we do not concede, the combination would still fail to render the claimed invention obvious. Tuttle fails to provide a motivation to modify the compositions in the manner claimed by the Appellant. Specifically, as a second step, one must choose from among the many components listed to arrive at an aliphatic amine aminating solution and a separate noble metal salt solution, i.e. palladium chloride. This requires choosing the palladium salt from among a list of alternatives. Further, this requires selecting an aliphatic amine which would complex with the palladium cation. However, neither the Tuttle nor the Miller reference teaches providing such an aliphatic amine which is designed to complex with the palladium. Pursuant to Tuttle, the surface first requires amination “with a solution of ethylenediamine or 1,3-diaminopropane.” See col. 3, ln. 10-11. This is not a complexing species, but rather an aminating agent for modifying an unconventional substrate, e.g. thermoplastics. The Examiner has failed to provide any specific reason, either explicitly in the references or reasons why someone skilled in the art would make such a modification, absent the teachings of the Appellant’s invention.

Likewise, Gedrat, does not provide a motivation to modify the compositions in the manner claimed by the Appellant. At best, Gedrat exemplifies an activating solution of a “palladium complex like, for example palladium sulfate in 2-aminopyridine”. See col. 4, ln. 53-56. The addition of 2-aminopyridine does not create a palladium aliphatic amine complex, as claimed, most notably because pyridine is aromatic and therefore does not meet the aliphatic requirement. As with Tuttle, the Examiner has failed to provide any specific motivation either explicitly in the references or reasons why someone skilled in the art would make a modification to an aliphatic amine complex absent the teachings of the Appellant’s invention.

Assuming that the above step can be made, a third step of combining the aminating

solution and palladium metal salt of Tuttle prior to application to the substrate would be required.

As mentioned before, the claimed invention requires a “palladium aliphatic amine complex” as an ingredient in the ink-jetable composition, i.e. prior to deposition on the substrate. The Examiner has argued that the modification is within a reasonable expectation of success. However, this blanket statement fails to recognize the prerequisite motivation to do so.

Further, Appellant asserts that the Tuttle reference specifically teaches separate steps due to the fact that the substrate is specially prepared. Thus, the aminating solution is designed to react with and improve adherence to the substrate. The presence of a metal cation such as palladium would interfere with this by complexing or otherwise associating with the amine components. Without this separate step, adherence would be reduced and the stated objectives of improving adherence would be impeded. Thus, the Tuttle reference would be incompatible with the suggestion that the aminating solution be combined with the metal salt prior to deposition for at least the reason that the aminating solution would no longer react with the substrate in the same manner. Therefore, this reference actually teaches away from the claimed invention. No such modification would be suggested nor would one skilled in the art be motivated to modify the disclosed separate treatment solutions in such a manner as to arrive at the claimed invention.

As a fourth step, the above modified solutions would then need to be made ink-jetable. As asserted above, the Tuttle reference teaches away from such a modification. Gedrat is likewise devoid of teaching modifications to the solutions such that they would be ink-jetable. Also, there is no motivation provided in Miller to retain the amine component when formulating an ink-jet composition, especially since such is taught as a separate solution from the palladium component in the Tuttle reference.

Fifth, the compositions applied to the substrate must then be heated in accordance with the claimed invention. None of the references teach or suggests such a heating step. Each reference teaches that, for their respective purposes, satisfactory results are achieved with no mention of heating. Although the Examiner has asserted that similar success would be expected with heating, the Appellant disagrees with this assessment. There would be no motivation to do so since acceptable results were obtained in the absence of heating which would entail unnecessary extra cost and potential damage to materials. Thus, the references fail to provide any motivation to make the extra step of heating. Regardless, the addition of heating is only one of at least five modification steps required to arrive at the claimed invention through significant reconstruction of the cited references.

b) Failure to Teach Each and Every Element

Even if the asserted references were combined as suggested by the PTO, the resultant combination would still fall short of yielding the claimed invention. According to M.P.E.P § 706.02(j), the asserted prior art reference (or references when combined) must teach or suggest all the claim limitations. See also In re Royka, 490 F.2d 981, 985 180 U.S.P.Q. 580, (CCPA 1974) (reversing an obviousness rejection because the essence of the claimed invention was not present in the asserted references). The combination of Tuttle or Gedrat and Miller fails to teach at least the required elements of (a) one composition with a solvated palladium aliphatic amine complex and a second composition with a reducing agent capable of reacting with the solvated palladium aliphatic amine complex to produce palladium metal; (b) an ink-jetable composition including a palladium aliphatic amine complex solvated therein; and (c) a step of heating

sufficient to cause reaction which forms palladium metal without substantially altering the substrate.

The combination fails to teach one composition with a solvated palladium aliphatic amine complex and a second composition with a reducing agent capable of reacting with the solvated palladium aliphatic amine complex to produce palladium metal. In Tuttle, one must choose from among the many components listed to arrive at an aliphatic amine aminating solution and a separate noble metal salt solution, i.e. palladium chloride. This requires choosing the palladium salt from among a list of alternatives. Further, this requires selecting an aliphatic amine which would complex with the palladium cation. However, neither the Tuttle nor the Miller reference teaches providing such an aliphatic amine which is designed to complex with the palladium. Pursuant to Tuttle, the surface first requires amination “with a solution of ethylenediamine or 1,3-diaminopropane.” See col. 3, ln. 10-11. This is not a complexing species, but rather an aminating agent for modifying an unconventional substrate, e.g. thermoplastics. Therefore, the Tuttle-Miller combination fails to teach one composition with a solvated palladium aliphatic amine complex and a second composition with a reducing agent capable of reacting with the solvated palladium aliphatic amine complex to produce palladium metal. As discussed previously, while Gedrat teaches a palladium complex, it is devoid of teaching a palladium aliphatic amine complex, and therefore cannot teach a solvated palladium aliphatic amine complex, let alone one that is capable of reacting to produce palladium metal.

Secondly, the combination of references fails to teach an ink-jettable composition including a palladium aliphatic amine complex solvated therein. The claimed invention requires a “palladium aliphatic amine complex” as an ingredient in the ink-jettable composition, i.e. prior



to deposition on the substrate. The Tuttle reference teaches separate application of the aminating solution and palladium metal salt to the substrate. Gedrat does not teach a palladium aliphatic amine complex, let alone one that is solvated in a composition. Additionally, while Gedrat does teach the use of palladium-containing compounds, it does not teach or suggest their use in a composition configured for use in ink-jet architecture. Furthermore, although Miller teaches application of compositions to a substrate using ink-jet architecture, Miller fails to teach the compositions of the present invention. Tuttle and Gedrat fail to teach the required compositions in ink-jettable form. In fact, as mentioned above, the Tuttle reference teaches away from such a modification.

Further, the combination of references fails to teach the step of heating sufficient to cause reaction which forms palladium metal without substantially altering the substrate. Tuttle, Gedrat, and Miller teach that, for their respective purposes, satisfactory results are achieved with no mention of heating.

Therefore, the combination of Tuttle or Gedrat and Miller fails to teach at least the required elements of (a) one composition with a solvated palladium aliphatic amine complex and a second composition with a reducing agent capable of reacting with the solvated palladium aliphatic amine complex to produce palladium metal; (b) an ink-jettable composition including a palladium aliphatic amine complex solvated therein; and (c) a step of heating sufficient to cause reaction which forms palladium metal without substantially altering the substrate.

c) Impermissible Hindsight

The Appellant further submits that the current rejections are based on indiscriminate

combination of references using impermissible hindsight. At the time Appellant filed the present application, none of the references would have suggested the invention as claimed. Tuttle is a reference teaching immersion plating to form coatings of plastic materials while Miller and Gedrat are very different approaches at forming electronic circuits. Appellant has discovered that ink-jetting of a specific class of palladium aliphatic amine complexes which are subsequently reduced can be highly useful in forming conductive pathways and circuits. It appears that the cited references have been assembled and significantly modified using Appellant's own specification as a roadmap to arrive at the claimed invention rather than identifying independent sources of motivation for doing so.


E. Conclusion

In conclusion, Appellants respectfully submit that the claims on appeal set forth in the Appendix are patentably distinct from the asserted prior art references. Particularly, none of the asserted references, or any combination thereof, motivates, teaches, or suggests with the requisite specificity to one of ordinary skill in the art, within the meaning of 35 U.S.C. §§ 103, to arrive at the presently claimed invention. Appellants contend the combination of Tuttle or Gedrat with Miller fails to teach or suggest each and every element of the claimed invention. Moreover, the combination of Tuttle or Gedrat with Miller does not provide sufficient teachings or motivation to combine in order to arrive at Appellant's invention. Further, the combination of references is based on impermissible hindsight.

Since the Patent Office has not met its initial burden of establishing that the claims lack novelty or that the claims are *prima facie* obvious, Appellants respectfully submit that all

remaining rejections are improper, and should be overturned.

Dated this 11<sup>th</sup> day of July, 2007.



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## VIII. CLAIMS APPENDIX

1-8. (canceled)

9. (previously presented) A method of forming an electrically conductive pathway, comprising steps of:

- a) jetting a first ink-jetable composition onto a substrate, said first composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;
- b) overprinting or underprinting a second composition with respect to at least a portion of the first ink-jetable composition to form a predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and
- c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate.

10. (original) The method of claim 9, further comprising depositing a conductive metal onto the palladium metal.

11. (original) The method of claim 10, wherein the conductive metal is selected from the group consisting of copper, gold, palladium, nickel, silver, rhodium, platinum, Co-Fe-B, Co-Ni-P, Co-Ni-Fe-B, Ni-Co, and mixtures or alloys thereof.

12. (original) The method of claim 10, wherein the step of depositing is an electroless deposition process.

13. (original) The method of claim 10, wherein the predetermined pattern is a non-continuous pattern of palladium aliphatic amine complex which, once reduced, is a seed for deposition of the conductive metal.

14. (original) The method of claim 9, wherein the second composition is underprinted with respect to the first ink-jetable composition.

15. (original) The method of claim 9, wherein the second composition is overprinted with respect to the first ink-jetable composition.

16. (original) The method of claim 9, wherein the aliphatic amine of the palladium aliphatic amine complex is selected from the group consisting of diamine alkanes, triamine alkanes, and mixtures thereof.

17. (original) The method of claim 16, wherein the aliphatic amine is 1,2-diaminopropane.

18. (original) The method of claim 9, wherein the substrate comprises a member selected from the group consisting of ceramics, polymers, cellulose, silicon, and mixtures thereof.

19. (original) The method of claim 9, wherein the step of applying the second composition is by ink-jetting, said second composition being ink-jetable.
20. (original) The method of claim 9, wherein the second composition further comprises a colorant.
21. (original) The method of claim 9, wherein the first composition further comprises a colorant.
22. (original) The method of claim 9, wherein the reducing agent is selected from the group consisting of formic acid, esters of formic acid, formic acid derivatives, hydrazine, alkali metal borohydride, oxalic acid, alkali or alkaline earth sulfites, and mixtures thereof.
23. (original) The method of claim 22, wherein the reducing agent is formic acid.
24. (original) The method of claim 9, wherein the step of applying heat occurs at from about 50° C to about 80° C.
25. (original) The method of claim 9, wherein the predetermined pattern is a circuit.
26. (withdrawn) A substrate having a circuit formed thereon, said circuit prepared by the method of claim 9.

27. (withdrawn) A substrate having a circuit formed thereon, said circuit prepared by the method of claim 10.

28.-34. (canceled)

35. (new) The method of claim 9, wherein the first liquid vehicle further comprises non-complexed amine.

IX. EVIDENCE APPENDIX

(No matter presented)



X. RELATED PROCEEDINGS APPENDIX

(No matter presented)